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RESEARCH

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Conhecimento dos graduandos de nutrição e enfermagem quanto ao consumo de corantes alimentares e seus efeitos adversos à saúde

Knowledge of nursing and nutrition graduate students on the consumption of food colorings and their adverse health effects

Conocimiento de los graduandos de nutrición y enfermería sobre el consumo de colorantes alimentares y sus efectos adversos para la salud

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ABSTRACT

Objective: evaluating the knowledge among Nutrition and Nursing graduate students of a public university regarding the dietary practices in relation to the consumption of food colorings and their health risks. **Methods:** this is a quantitative and qualitative cross-sectional study in which a semi-structured questionnaire was applied to new graduate students of the Nursing and Nutrition courses at a public university. **Results:** the study showed that the knowledge concerning healthy eating is not clear to graduates yet, and the excessive consumption of food colorings through goodies are still present in their daily diet. Graduates admit the existence of adverse effects caused by the dyes and industrialized products, even though the knowledge about the additives is not clear. Reading and understanding the labels was not really clarifying, mainly by inefficient information on the packages and a lack of reliability from the manufacturer. **Conclusion:** actions regarding clarification on these products' information are required.

Descriptors: Healthy Eating; Artificial Coloring; Food Additives.

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RESUMO

Objetivo: avaliar o conhecimento entre os graduandos de Nutrição e Enfermagem de uma universidade pública quanto às praticas alimentares em relação ao consumo de corantes e seus riscos à saúde. **Método:** trata-se de um estudo descritivo transversal quanti-qualitativo onde foi aplicado um questionário semiestruturado aos graduandos ingressantes no curso de Nutrição e Enfermagem de uma universidade pública. **Resultados:** o estudo mostrou que o conhecimento de alimentação saudável ainda não está claro para os graduandos e que o consumo de corantes é excessivo através de guloseimas que ainda se fazem presentes na alimentação. Os graduandos admitem a existência de efeitos adversos causados pelos corantes e pelos produtos industrializados, mesmo que o conhecimento sobre os aditivos ainda não esteja claro. A leitura e compreensão dos rótulos foram inadequadas, principalmente por deficiência de informações da embalagem e confiabilidade no fabricante. **Conclusão**: considera-se que ações de esclarecimentos quando às informações destes produtos são necessárias.

Descritores: Alimentação saudável, Corantes artificiais, Aditivos alimentares.

RESUMEN

Objetivo: evaluar el conocimiento entre los graduandos de Nutrición y Enfermería de una universidad pública cuánto a las prácticas alimentares en relación al consumo de colorantes y sus riesgos para la salud. **Método**: se trata de un estudio descriptivo transversal cuanti-cualitativo en el cual fue aplicado un cuestionario semi-estructurado a los graduandos ingresantes en el curso de Nutrición y Enfermería de una universidad pública. **Resultados**: el estudio mostró que el conocimiento acerca de la alimentación saludable aún no está claro para los graduandos y que el consumo de colorantes es excesivo, a través de dulces que todavía se encuentran en la alimentación. Los graduandos admiten la existencia de efectos adversos causados por los colorantes y por los productos industrializados, por más más que el conocimiento acerca de los aditivos aún no estea claro. La lectura y la comprensión de los rótulos fueron inadecuadas, principalmente por deficiencia de información en el embalaje y la confiabilidad en el fabricante. **Conclusión**: se considera que son necesarias acciones que aclaren las informaciones de estos productos.

Descriptores: Alimentación Saludable; Colorantes Artificiales; Aditivos Alimentarios.

INTRODUCTION

The National Policies for Food and Nutrition (PNAN),[1] defines that "adequate and healthy food are appropriate to biological and sociocultural aspects of individuals feeding practices, as well as the sustainable use of the environment. In this sense, it must be in accordance with the requirements of each phase of the life course and the special dietary needs, referenced by the food culture and the dimensions of gender, race and ethnicity, accessible physically and financially, harmonic in quantity and quality, based on adequate and sustainable production practices with minimal amounts of physical, chemical and biological contaminants. "But the food profile of the Brazilian population has undergone changes, causing a transition to the epidemiological profile that has been provided in part by high consumption of processed foods, which have in their composition food additives such as colorings, food preservatives, antioxidants, flavor enhancers, among others[2]. The limited availability of time, allied to the convenience and low cost of most of the processed food, favor the consumption of foods with high energy density, low nutritional value and food additives.

In the last decades, it has been occurring a change in dietary habits of the population, a fact that has drawn attention from regulators and the scientific community, because the replacement of perishable foods by processed foods is contributing to a poorer diet in vitamins (A, C, E and B), minerals (calcium, iron and zinc) and fibers (soluble and insoluble) complex. Besides the modification of diet over the time, the food industry, in order to increase the shelf life of products, has used technology to their advantage, creating doubts on the safe use of food additives, particularly regarding the use artificial dyes.[3,4]

According to ANVISA (1997):[5] "food additive is not usually a nutritious ingredient, intentionally added to food in small quantities to improve its appearance, aroma, flavor, color, texture and conservation during all stages of processing." Food additives may be from animal or synthetic chemical origin, and divided among dyes, preservatives, antioxidants, emulsifiers, flavor enhancers, stabilizers, and thickeners, acidulates, flavors, artificial sweeteners and anti-foams.

The ADI (Acceptable Daily Intake), developed by the Expert Committee on Food Additives of the Food and Agriculture Organization/World Health Organization[6], evaluates the safety of additives at the global level, which defines non-nutritive additives like substances intentionally added to food, usually in small amounts to improve their appearance, aroma, flavor, color, texture and conservation.

The National Health Surveillance Agency (ANVISA) published resolutions that establish maximum allowable limits for the use of additives for different food categories in order to minimize risks to human health.[7] Adverse effects of these substances, such as food hypersensitivity, attention deficit, Hyperactivity Disorder Deficit and cancer should be merited the attention of public health.

The marketing involved in the disclosure of ultra-processed foods is one factor that influences the consumption of these foods; advertising is designed to encourage the use of products by the population. In Brazil, there are few studies on propaganda, advertising and promotion of foods. But it is known that most commercial aired on television is related to foods high in sugar, fat and salt by children and teenagers.[8] The argument used so that there is greater control over the marketing is that the nutritional health is the choice and responsibility of each individual. However, it depends on the options available for choice; then the State is responsible for creating supportive environments, thus fulfilling its obligations of facilitation of the rights to food and health.[8]

Several studies are being conducted to identify the adverse reactions of food additives on human health.[9] Those that most stand out are the dyes, mainly artificial, as tartrazine, amaranth, ponceau 4R, erythrosine and bright

green, that are responsible for allergic reactions such as asthma, rhinitis and urticarial. Defined as a hypersensitive response to allergens (antigens) with various symptoms, allergies can be stimulated by the environment and thus can be stimulated by food or allergenic ingredients containing the human body substances.[10,11,12] Another adverse effect has also been observed from the consumption of additives, colors more accurately, is the Attention Deficit Hyperactivity Disorder (ADHD).[13,14]

Given the above, this study evaluated the knowledge of undergraduate students of Nursing and Nutrition of a public university in Rio de Janeiro, as feeding practices, with regard to the consumption of dyes and their adverse health effects.

METHODS

This is a study of quantitative quality character consisting of 141 students of the Nutrition and 53 of the Nursing program at a public university in Rio de Janeiro, who attended the first and second periods of the respective courses in the years 2011-2012. In this evaluative research for qualitative method, it works with attitudes, beliefs, behaviors and actions, seeking to understand how graduate students interpret and give meaning to their experiences regarding the consumption of food additives and adverse health effects.

The quantitative method is related to a deductive approach, seeking from a general theory, observing particular cases, trying to confirm the hypothesis investigated or generate others. The quantitative approach is important to present results that can be counted and expressed in numbers, rates, and proportions.

For data collection, a semi-structured questionnaire was applied. The questionnaire is an instrument composed of a set of prepared questions, in general, in order to gather information about the perceptions, beliefs and opinions of individuals about themselves and goals, people, present events in their midst. The filling was made of the form of self-administration group, using the available rooms at the University, where doubts about the questionnaire could be clarified.

The questionnaire had questions about food and modification of power over the years, emphasizing the consumption of processed products containing additives, especially colorings.

The sample was selected at random, consisting of nutrition and nursing students enrolled in the School and coursing between the first and second periods.

The study was submitted to the Ethics Committee of the Federal University of the State of Rio de Janeiro (UNIRIO) and approved CAAE (0001.0.313.000-10), attending the standards of the National Council on Ethics in Research. The participation of graduate students in nutrition and nursing occurred from the formal permission by signing an informed consent, after due clarification on the research objectives.

RESULTS AND DISCUSSION

There were 141 questionnaires completed by graduate students of Nutrition and 53 by Nursing students.

When analyzed, the responses about what was healthy eating for students who were part of the survey, 68% of Nursing graduates failed to properly define the concept of healthy eating. Still were asked if their feeding had changed over the years, and 77% of participants reported that there was a change. Among the Nutrition students, 58% were able to define what is adequate food, but 31% of the students reported that healthy eating is a "balanced diet", but did not describe what would be that kind of eating. Also, 82% informed having been changes over their lives about the dietary pattern comparing to the present day.

Below, the opinion of Nutrition and Nursing graduates at a public university, regarding perception of healthy eating and it's modification along the years.

> *"A food that meets the needs of the individual. Yes. A higher consumption of processed products" (Nutrition student).*
>
> *"Rich in fruits, vegetables, cereals and some meat. Yes, because when I was a kid was more controlled and healthy, today's addition of fast food" (Nutrition student).*
>
> *"Healthy eating has regular hours and very varied with vegetables, vegetables and fruits. There was no change in my diet as a child and nowadays" (Nutrition student).*
>
> *"Don't. Yes. Before you had time to feed myself at home, eat more fruits" (Nursing student).*
>
> *"Balanced, with vegetables, a little carbohydrate and protein. Yes, because I was eating more at home, as soon as the food was healthier. And also had the mother taking care" (Nursing student).*
>
> *"A healthy diet is based on fiber, fruits, cereals, fresh and natural things, grains and etc. Today's feed has changed and a lot of the time I was a kid, because today life is faster" (Nursing student).*

For most respondents, a healthy diet is based on a large amount of fruits and vegetables, and no fat, with no note of the importance of other foods such as cereals, legumes and proteins of high biological value such as meat, fish, milk and dairy products, including the importance of the use of vegetable lipids in the diet. As was mentioned earlier, PNAN[1] considers healthy eating much more than the food choices, for example, one should respect the cycles of life, special needs, culture, harmony of quantity and quality, and contaminant-free food.

The change in the world under the concept of healthy eating is visibly observed. Issues such as hunger and nutritional deficiencies are associated with socio-political context. In

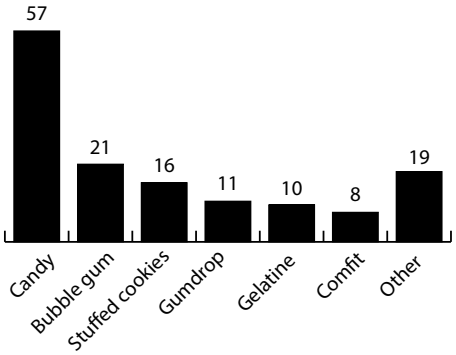
parallel, there is a concern with the excessive consumption of some nutrients and energy in the diet, as well as problems associated with chemical contamination of food.[15]

Respondents reported consuming food products with dyes, 91% and 88% of Nursing students and Nutrition, respectively, declare liking goodies. The graph below (Chart 1) highlights the frequency of consumption of sweets for all students who participated in the study, the ones that appeared most were: hard candies (57%), chewing gum (21%), sandwich cookies (16%), and gums (11%), gelatin (10%), confectionery (8%) and other (19%). It was observed in this study that there is a high consumption of sweets by the interviewed university students, which may influence on the poor quality of the diet, because these products there is a significant concentration of food additives, especially artificial colors, and carbohydrates.

It is believed that the consumption of such food has begun in childhood and persists to this day, in adulthood. Studies on the consumption of sweets are more frequent in children as they are a more vulnerable group to additives for they have a higher intake in relation to body weight at this stage than in adults, with this, IDA can be exceeded with low consumption amount of processed foods.[16,17] Another factor that justify a larger number of studies in children is the psychological immaturity, where the excretion of additives may be impaired, as the ability to control intake, because the child has no self-control.[2]

Chart 1 shows the most commonly consumed goodies by university students.

Chart 1 – Frequency of goodies most consumed

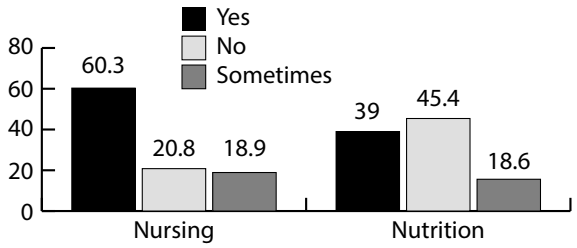


As for the habit of consuming and buying these foods, 60,3% of Nursing students reported consuming them, while most Nutrition students reported that it is not usual for them to buy these foods, 45,4% of respondents (Chart 2). The response of the students of Nutrition may have been influenced by the choice of the course, demonstrating that they entered the university seeking knowledge about food and nutrition in health problems. Another factor that may have contributed to the response is the knowledge acquired in basic Nutrition periods in college, as the discipline of Food Biochemistry, taught in the first semester of Nutrition.

During childhood, especially in pre-school stage, the individual begins to have greater access to foods such as candies, snacks, sandwich cookies, jellies, chewing gum which increases the intake of food dyes. At this stage of life there is no control for the consumption of these goodies, a fact that occurs in adults who have self-control in what they are consuming, you can choose to continue consuming these foods or remove them from your eating routine[2]. What was observed between Nutrition students is that the majority of them stated to consume this food, but most of them have no habit to consume these products in their daily lives. On the other hand, the majority of Nursing students not only reported consuming this type of food, but they also do that as a food habit.

In Chart 2 there is a comparison between Nutrition and Nursing graduate students as their habit of buying colored foods. Of Nursing graduates, 60,3% declared to buy it regularly, 20,8% don't have this habit and 18,9% sometimes buy it. Among the students of Nutrition, 45,4% reported having a habit of buying it, 39% don't and 15,6% do it sometimes.

Graph 2 – Comparison of nutrition and nursing students about the habit of buying colorful foods



Regarding the color of candy, 70,2 of the students thought the color influences the consumption.

Below are highlighted some lines of Nutrition students relating to the importance of color to foods.

> *"Yes. I think the color is always a ruse for consumption along with the appearance of goodies. For example, if a piece of chewing gum has a vibrant color like red, he is more attractive than a white gum."*

> *"Yes. The colors are becoming more vibrant and varied, associating with the flavor, which sharpens the desire."*

> *"No, I really like, bullets and chewing gum which even consumption are colorful, but certainly for the children colored bullets are more appealing."*

Like most Nursing students (69,8%) can be observed not believe that the color be a factor influencing the consumption of processed foods.

Following the lines of Nursing students about the influence of the color of food in the consumption of industrial products are presented.

"Not always. For me what attracts is the taste."

"No, actually I don't like artificial aspect of the goodies."

"Not necessarily the delicacy, more packages are attractive."

The colors are present everywhere and are able to influence our decisions, especially regarding the choice of food. There are affected by color: appearance, acceptability, food safety and sensory characteristics. Is often made the relationship between color and food, this association is related to cognitive development, which depends on the experiences and the memory of each person.[18]

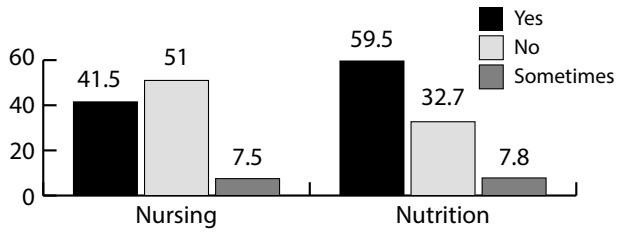
The color may interfere on the food acceptance as we see through colors, flavors, consequently influencing the acceptance of foods and beverages.[18]

For industrialized food color is increasingly relevant, as is the presentation of what is sold, so how it will be accepted by consumers and can be a parameter of quality of the food or using dyes to stimulate appetite[19]. Is rarely consumed a food unappealing to the eye, so we can say that the colors have an important role in the acceptance of food.[19]

Regarding the reading and understanding of food labels, it is known that it is important, because the consumer has the opportunity to meet the nutritional composition and all the ingredients, such as food additives that constitute the product. In this study undergraduates were asked how to read and understand food labels. Most Nutrition students reported having the habit of reading labels, 59,6% of respondents, since the majority of Nursing students (51%) do not usually read the label of processed foods. As for understanding the responses were reversed, Nursing students (47,2%) reported that they understood the product labels, while among the Nutrition students, 42% responded that they did not understand the labels. Again it was observed that the choice of course may have influenced the response, noting that students of Nutrition have more interest in reading food labels.

The following is a comparison between graduate students of Nutrition and Nursing who have the habit of reading labels of processed foods. Of Nursing graduates, 51% used to read labels and 41,5% did not read, and 7,5% sometimes read the labels. Already, the students of nutrition, 59,6% reported reading the label, 32,7% read and 7,8% did not read sometimes (Chart 3).

Chart 3 – Comparison of nutrition and nursing graduates about the habit of reading the labels



As for reading the labels of manufactured food products by university students of Nutrition and Nursing, some lines are highlighted below.

"Yes. The amount of calories per gram. The nutritional value in general calls me attention" (Nutrition student)

"Yes. Ingredients, composition and period of validity" (Nutrition student)

"Yes, validity and nutritional information" (Nutrition student)

"I prefer not to read, know how much do wrong, that have excess substances" (Nutrition student)

The students of nursing reported regarding to reading labels of processed products the following:

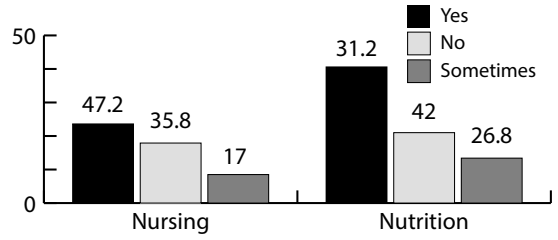
"I prefer not to read, know how much do wrong, that have excess substances" (Nursing student).

"Rarely read the labels. At most I see the calories and trans fats" (Nursing student).

"Yes. The amount of calories, cholesterol and sodium and fat levels" (Nursing student).

In Chart 4 is the comparison between graduate students of Nursing and Nutrition that understand the labels of processed foods. Of Nursing graduates, 47,2% understood the labels and 35,8% did not understand, and 17% sometimes understand the labels. Among the students of Nutrition, 31,2% reported understand labels, 42% understand and 26,8% did not understand sometimes.

Chart 4 – Comparing the nutrition and nursing students regarding the understanding of the labels of processed products



In addition to identifying if university (Nutrition and Nursing) read the labels of processed foods, but if they understood the information contained therein.

"Don't. My biggest difficulty is regarding too few ingredients" (Nutrition student)

"Generally yes, but the biggest difficulty is due to insufficient faults information on labels" (Nutrition student)

"It depends; some labels are few explanatory and illustrative" (Nutrition student)

"Don't. What else makes the understanding is the fact of not having caption for abbreviations" (Nursing student)

"To be able to read, because the captions are minimal" (Nursing student)

"Yes. Greatest difficulty is in finding the label" (Nursing student)

The code consumer (1990)[20] establishes the National Policy on Consumer Law, which aims to meeting the needs of the consumer. The manufacturer has the responsibility to provide adequate information of the product that is available in the case of food that information must be present on the labels.[21]

Food labeling has the function of informing the consumer, who must read the label upon purchase. The population has difficulty in acquiring the habit of reading for not understand the information on the product package. The use of technical language can be attributed to the difficulty of reading labels, where understanding is better for a more specific audience, so there is a contradiction in labeling for not performing the function as a link between the product and the consumer, being understood only by a more capable public, being by knowledge regarding substances used or by the language present on the package.[22] Unlike the study where Nursing students who would be the audience showed a less specific understanding of labels, but also have more interest in reading the package of food products.

Many consumers do not understand the benefits of labels and end up not showing interest in the information, educational activities should be developed in order to assist consumers in their food choices.

One study found that consumers do not trust the labels, especially in the ingredients, or even people who have the habit of reading the information from the manufacturer do not trust it to be true.[21]

Concerning knowledge of food additives was asked if had heard and knew what an additive, among students of Nutrition, 62% reported at least some knowledge on the subject; and among the Nursing students, 74% said they did not know what an additive is. The nutrition students have, in their first and second periods, disciplines that address content about food.

The labels contain the additives contained in industrial products as ingredients, but is only indicated, so there is no guarantee that the consumer knows the possible risks to human health that these substances can cause. The lack of information about food additives makes it impossible for consumers to make healthier choices.[23]

We highlight below the lines of graduating (Nutrition and Nursing) as regards the knowledge of food additives:

"Yes. I think are substances to increase the nutritional value, making the food more attractive" (Nutrition student)

"Yes, are substances added to improve the color, consistency, increase the shelf time and other functions" (Nutrition student)

"I have no idea! Is it any supplement?" (Nutrition student)

"No, but I suppose they must be additions of chemicals in food" (Nursing student)

"Yes. I believe it is a food supplement for a full feed and contributing with all necessary nutrients" (Nursing student)

"Don't. Perhaps it is a food supplement, as for example, the human ration" (Nursing student)

Addressing the consumption of processed foods and these can harm the health, all the Nutrition students believed that consumption of processed products could bring some harm to health, 96% of Nursing students also believed the adverse effects of industrialized products.

The changing of the economic profile of the population made the consumer market expand. At the same time the purchasing power increased, the price of food decreased, favoring the consumption of more processed foods, such as processed products. Coupled with the economic factor has contributed to the practicality introduction of industrialized food habits in the family. Observed an excess consumption of these foods, which may jeopardize the health, as these products are high in refined sugars, high energy value, fats, sodium, and also contribute to the reduction of food consumption "*in natura.*"[24]

The following are the lines of graduating (Nutrition and Nursing) regarding the perception of health risks caused by the consumption of processed products:

"Excess sodium, chemistry can generate allergy and first buildup in the body and sodium being a risk factor for hypertension" (Nutrition student)

"Yes, it can cause allergies, for example. Due to the presence of any product/substance that can be consumed, even without the consumer's knowledge causing allergies" (Nutrition student)

"Yes, it may bring benefits and harms, the use of dyes and preservatives in foods that are more perishable or to facilitate its sale, improve the taste can be a risk to health. Due to large amount of sodium, dyes, fats and calories that have, can cause increased blood pressure, obesity, hypervitaminoses, among other" (Nutrition student).

"Yes. Cancer, allergies, etc. The body and our bodies are not prepared, sometimes, to metabolize them" (Nursing student).

"I imagine that will bring, but I don't know how" (Nursing student).

"Yes. A future hypertension (high sodium levels), accumulation of fat in the arteries, among others. Our daily sodium consumption increases, consumption of fats and carbohydrates, it also contributes to the injury of health" (Nursing student).

Regarding the consumption of dyes, 91% of graduate students of Nutrition and 90% of Nursing believed that consumption of these products could harm the health, but the rest of the Nutrition students respondents and 3,8% of the Nursing students respondents did not know how this kind of additive can act on the human body.

Many studies report adverse reactions to the consumption of additives. Allergies are included in these purposes is defined as a hypersensitivity reaction to allergens (antigens), among the dyes that can cause these effects highlight the tartrazine dye, amaranth, ponceau 4R, erythrosine and bright green[3]. Other effects have been evidenced in disorder and attention deficit hyperactivity disorder[25], and deficit may also have mutagenic and carcinogenic effects, studies have shown that dietary factors can influence positively or negatively in the incidence of cancer, artificial dyes are listed potential carcinogens.[4]

In respect of harm caused by the consumption of processed foods with dyes, the perception of graduating was as follows:

"Can harm, I don't know how..." (Nutrition student)

"I've heard of relationship between yellow dyes and problems of hyperactivity/attention deficit, but I don't know if proceeds" (Nutrition student).

"Yes. Many people are allergic to artificial colorings" (Nutrition student).

"Yes. Because it is artificial, then passes by the body without being taken advantage of by him, in this way with a very frequent intake can lead to a cell mutation" (Nursing student).

"Yes. Because the presence of the colorants can cause allergy or intolerance" (Nursing student).

"Yes. The dyes used in these foods are initiators of diseases such as cancerous tumors" (Nursing student).

Regarding the existence of a family history of food allergies 53,9% of Nutrition students reported having any allergies, and the majority of Nursing students, 51%, did not have this family history. Allergy to food dye is common among 33% of graduating Nutrition respondents and 20% of the Nursing students reported having a history. The yellow dye was what appeared as most responsible for allergies.

With the evidence of adverse effects of tartrazine yellow dye the National Health Surveillance Agency (ANVISA) through Resolution *RE No. 572* of April 5th, 2002[26], puts it obligatory that the drug packaging and leaflets highlighting containing dye. In return, this requirement does not exist for processed foods. Hypersensitivity to this dye occurs most frequently in atopic individuals or intolerance to salicylates, ranging from 0,6% to 2,9% of the population. The main clinical features are hives, bronchospasm, angioedema, rhinitis[10]. The yellow twilight is another dye that causes many reactions in the population, such as causing anaphylactoid angioedema, anaphylactic shock, vasculitis and purpura. There is the possibility of cross-reaction with other substances such as paracetamol, acetylsalicylic acid, sodium benzoate and other dyes of the Azo group.[27,28]

CONCLUSIONS

Conceptualize eating healthy consists in considering various aspects including the biological and sociocultural. It is important to respect each life cycle and the individuality of the human being containing a minimum of physical, chemical and biological contaminants. But with modern life, the search for a quality power supply was replaced by a practical power, to save time, so the processed foods have taken the place of prominence. Ultraprocessed foods contain several food additives that can cause adverse effects to human body as hypersensitivity, hyperactivity and neoplasms when consumed in large quantities. And marketing tends to grow as the demand of modern life increases the consumption of these products.

In this study with University students of nutrition and nursing it was observed that the concept of eating healthy isn't clear to both courses, even to students of Nutrition, where most undergraduates has defined as a balanced diet, but not detailed the basis of that power supply. It was noted that there is an excessive consumption by these students of industrialized ultra-processed products containing artificial dyes. However, Nursing students have the habit of consuming these foods more frequently than those of Nutrition, using these foods in their daily lives. It was a major concern of nutrition has with food additives. Perhaps this fact should the choice of course, because the nutritionist has the food as a tool of their activity. It was perceived by the population studied possible adverse effects to health caused by processed foods. This fact demands the need to improve eating habits.

The problem encountered by many was in reading and understanding on food labels. Even those who reported greater understanding showed dissatisfaction with the packaging by having small print or rely on the information from the manufacturer. Since it's a comprehensive problem,

area-oriented public policy on food and nutritional security could assist the population in understanding of these labels, as well as in the selection of healthier food.

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